1.2 Characteristics of a Function

A Function is a relation that for every x (**independent variable**) there is one and only one y (**dependent variable**)

Relation: relationship between two variables

Given the following relations which model represent a function?

Table of values

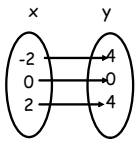
x	y
3	4
2	5
1	6
1	7
0	8

Not a function

x	y
2	4
1	1
6	0
-1	1
-2	4

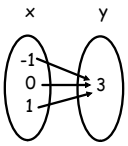
Mapping Diagram:

one to one



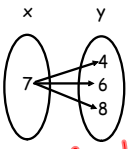
Function

many to one



Function

one to many

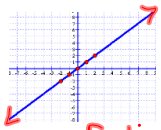


Not function

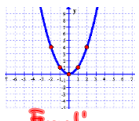
Graphs:

Do the vertical line test
If the vertical line crosses the graph more than once at any point on the graph it is not a function

if it does cross you can see that one x has more than one y not a function



Function



Function

Not a function

Equations:

y = 3x+1 (picture it)

y=mx+b

Graph TOV

x	y
-2	
-1	
0	
2	

$y = \pm\sqrt{x}$

x	y
0	0
4	±2
9	±3
16	±4
25	±5

x No a function

Words: Sarah is 5 years older than Joe

$S = J+5$

$y = x+5$

function.

Set notation: way of writing a set of items or numbers within curly brackets, { }

Example:

a)

x	y
-1	4
0	6
1	8
2	10

$x=\{-1,0,1,2\}$

b) The set of integers:

$\{x|x \in I\}$

"The set of all x such that x is an element of the integers"

From your text define:

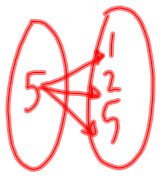
Domain: The set of all values for which the independent variable is defined
ie. all the x values

Range: The set of all values of the dependent variable.
ie. all the y values

For each of the following relations, determine
* The domain and range
* Whether or not it is a function

Ex.1 (x,y) = (number of coins flipped, number of times heads occurs)
= {(5,2), (5,1), (5,5), (5,2)}

D = {5}
R = {1,2,5}



Not a function

Ex.2 D = {-1, 0, 1, 2 }
R = { -3, 1, 5, 9 }

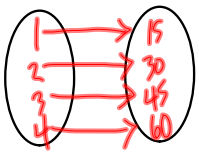
x	y
-1	-3
0	1
1	5
2	9

Function

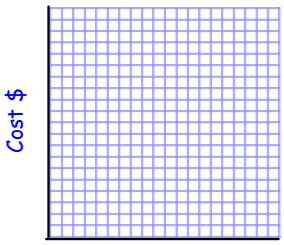
Ex 3:
CD's are $15 each. Show the relationship between cost and the number of CD's in a variety of ways:

Table of values Mapping Diagram

n	C
1	15
2	30
3	45
4	60



Graph:



Notice data is discrete
(you can't buy half a CD)
Do Not connect the dots

Stating Domain and Range:

Domain:

D= { 0,1,2,3, . . . }

Range:

R = { 0, 15, 30, 45, . . .}

Expressing Domain and Range as a list here is ok because data is discrete

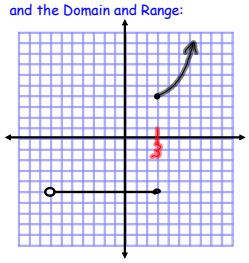
Recall Reading math:

D= { x / -2 < x ≤ 7, x ∈ R }

$d=\{x|x>7, x\in R\}$

$r=\{y|y=-5 \text{ or } y\geq 4, y\in R\}$

Ex 4: State wether the following is a function or not and the Domain and Range:



Function or not?

Not a fn. because at x=3 there are two values of y (does not pass the vertical line test)

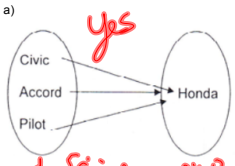
Domain and Range:

D={x/ x> − 7,x∈R}

R={y/y= −5 or y≥4,y∈R}

Ex 5. State wether the following are functions or not and their Domain and Range:

a)



Yes

$d=\{Civic, Accord, Pilot\}$

$r=\{Honda\}$

b)

x	y
21	0
21	1
22	5
45	0

$d=\{21,22,45\}$

$r=\{0,1,5\}$

Not function

c)

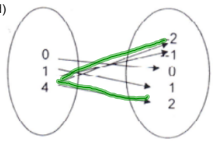
x	y
-2	3
-1	0
0	-1
1	0
2	3

$d=\{-2,-1,0,1,2\}$

$r=\{-1,0,3\}$

Function

d)

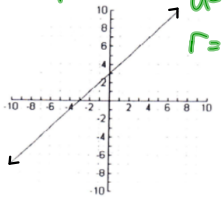


$d=\{0,1,4\}$

$r=\{-2,-1,0,1,2\}$ Not function

Ex 6. State wether the following are functions or not and their Domain and Range:

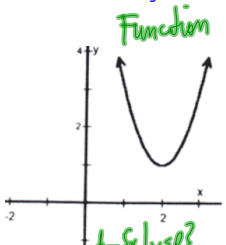
a) Function



$d=\{x\in R\}$

$r=\{y\in R\}$

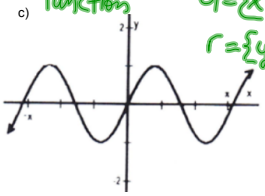
b) Function



$d=\{x|x\in R\}$

$r=\{y|y\geq 1, y\in R\}$

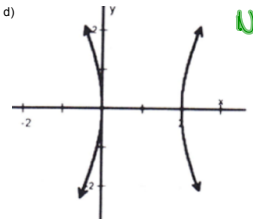
c) Function



$d=\{x|x\in R\}$

$r=\{y|-1\leq y\leq 1, y\in R\}$

d)

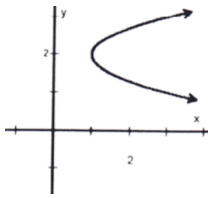


Not function

$d=\{x|x\leq 0 \text{ or } x\geq 2, x\in R\}$

$r=\{y\in R\}$

e)



Not a function

$d=\{x|x\geq 1, x\in R\}$

$r=\{y\in R\}$

HMWK: (Ch 1.1) p. 13 # 1-4, 6c, 7, 13 and worksheet